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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/693,584
Filing Date: October 24, 2003
Appellant(s): ZHAO ET AL.

Catherine L. Bell
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 5/18/2010 appealing from the Office action mailed 5/12/2009.

(1) Real Party in Interest

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

(2) Related Appeals and Interferences

The following are the related appeals, interferences, and judicial proceedings known to the examiner which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal:

USSN 10/692,827, filed October 24, 2003 is also appealed.

(3) Status of Claims

The following is a list of claims that are rejected and pending in the application:

2-6, 9-11 and 13-17

(4) Status of Amendments After Final

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

(5) Summary of Claimed Subject Matter

The examiner has no comment on the summary of claimed subject matter contained in the brief.

(6) Grounds of Rejection to be Reviewed on Appeal

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the

subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

WITHDRAWN REJECTIONS

The following grounds of rejection are not presented for review on appeal because they have been withdrawn by the examiner. The provisional obviousness-type double patenting rejection over copending application number 10/692,827, of claims 2-6 and 9-17, has been withdrawn.

(7) Claims Appendix

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

(8) Evidence Relied Upon

6,307,087	BUCHWALD et al.	10-2001
4,377,528	BEACH et al.	03-1983
2001/0044508	LOVEDAY et al.	11-2001
7,199,075	SPEISER et al.	04-2007

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 2-6 and 13-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Buchwald et al. (USP 6,307,087).

For the purpose of this action, it is assumed that claims 13-14 depend on claim 2.

Regarding claims 2, 13-16

Buchwald teaches an improved catalyst made by reacting a metal precursor with novel ligand (abstract). Buchwald teaches the use of a ligand that reads directly on the instant invention, reading on Y = biphenyl. (see formula 4, column 7, lines 5-45)

Buchwald teaches that the metal precursor could be $NiCl_2[P(C_6H_5)_3]_2$ (column 32, lines 22-32), which would leave chlorines, reading on the limitation of X in the instant claims.

Regarding claims 3-6

Buchwald teaches a ligand reading on these limitations (see formula 24, column 25, lines 56-65).

Regarding claim 17

This claim only further limits claim 16 when y is not equal to 0.

Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buchwald et al. (USP 6,307,087) as applied to claim 2 above, and further in view of Loveday et al. (US 2001/0044508).

Although, Buchwald does not teach these ligands for the X ligands, Buchwald does teach the use of chloride as these ligands. Buchwald also teaches:

"Transition metal catalyst complexes play important roles in many areas of chemistry, including the preparation of polymers and pharmaceuticals. The properties of these catalyst complexes are recognized to be influenced by both the characteristics of

the metal and those of the ligands associated with the metal atom. For example, structural features of the ligand can influence reaction rate, regioselectivity, and stereoselectivity. Bulky ligands can be expected to slow reaction rate; electron withdrawing ligands, in coupling reactions, can be expected to slow oxidative addition to, and speed reductive elimination from, the metal center, and electron rich ligands, in coupling reactions, conversely, can be expected to speed oxidative addition to, and slow reductive elimination from, the metal center.

In many cases, the oxidative addition step in the accepted mechanism of a coupling reaction is deemed to be rate limiting. Therefore, adjustments to the catalytic system as a whole that increase the rate of the oxidative addition step should increase the overall reaction rate (column 1, lines 15-35)".

However, because Loveday teaches "other ligands may be bonded to the metal M, such as at least one leaving group Q. In one embodiment, Q is a monoanionic labile ligand having a sigma-bond to M. Depending on the oxidation state of the metal, the value for n is 0, 1 or 2...Non-limiting examples of Q ligands include weak bases such as amines phosphines ethers carboxylates, dienes, hydrocarbyl radicals having from 1 to 20 carbon atoms, hydrides or halogens and the like…Other examples of Q ligands include those substituents for R as described above and including..heptyl, tolyl,…phenoxy,… (paragraphs 0053-0054), showing that ligands such as chloride, heptyl, hydride and phenoxy are functionally equivalent, it would have been prima facie obvious to one of ordinary skill in the art at the time of invention, to modify the teachings of Buchwald, by substituting the chloride ligands for other functionally equivalent

monoanionic labile ligands such as heptyl, hydride, amines or phenoxy, with a reasonable expectation of success, as suggested by Loveday, and with the expected benefit of being able to tune the reaction rate by adjusting the electronic character of the metal, by changing the labile ligand, and being able to increase or decrease the reaction rate through the increasing or decreasing rate of obtainment of the rate limiting transition state.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Buchwald et al. (USP 6,307,087) as applied to claim 2 above, and further in view of Speiser et al. (USP 7,199,075).

Although, Buchwald does not teach these ligands for the X ligands, Buchwald does teach the use of chloride as these ligands. Buchwald also teaches:

"Transition metal catalyst complexes play important roles in many areas of chemistry, including the preparation of polymers and pharmaceuticals. The properties of these catalyst complexes are recognized to be influenced by both the characteristics of the metal and those of the ligands associated with the metal atom. For example, structural features of the ligand can influence reaction rate, regioselectivity, and stereoselectivity. Bulky ligands can be expected to slow reaction rate; electron withdrawing ligands, in coupling reactions, can be expected to slow oxidative addition to, and speed reductive elimination from, the metal center, and electron rich ligands, in coupling reactions, conversely, can be expected to speed oxidative addition to, and slow reductive elimination from, the metal center.

In many cases, the oxidative addition step in the accepted mechanism of a coupling reaction is deemed to be rate limiting. Therefore, adjustments to the catalytic system as a whole that increase the rate of the oxidative addition step should increase the overall reaction rate (column 1, lines 15-35)".

However, because Speiser teaches that a catalyst comprising L_2NiX_2 , where L is equal to a bidentate ligand, and X can be an alkyl or chloride (column 1, line 66 to column 2, line 25), it would have been prima facie obvious to one of ordinary skill in the art at the time of invention, to modify the teachings of Buchwald, by substituting the chloride ligand for an alkyl radical ligand, as suggested by Speiser as being functionally equivalent, with a reasonable expectation of success, and the expected benefit of increasing the reaction rate by using a more electron rich metal, as suggested by Buchwald.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Buchwald et al. (USP 6,307,087) as applied to claim 2 above, and further in view of Beach et al. (USP 4,377,528).

Although, Buchwald does not teach these ligands for the X ligands, Buchwald does teach the use of chloride as these ligands. Buchwald also teaches:

"Transition metal catalyst complexes play important roles in many areas of chemistry, including the preparation of polymers and pharmaceuticals. The properties of these catalyst complexes are recognized to be influenced by both the characteristics of the metal and those of the ligands associated with the metal atom. For example,

structural features of the ligand can influence reaction rate, regioselectivity, and stereoselectivity. Bulky ligands can be expected to slow reaction rate; electron withdrawing ligands, in coupling reactions, can be expected to slow oxidative addition to, and speed reductive elimination from, the metal center, and electron rich ligands, in coupling reactions, conversely, can be expected to speed oxidative addition to, and slow reductive elimination from, the metal center.

In many cases, the oxidative addition step in the accepted mechanism of a coupling reaction is deemed to be rate limiting. Therefore, adjustments to the catalytic system as a whole that increase the rate of the oxidative addition step should increase the overall reaction rate (column 1, lines 15-35)".

However, because Beach teaches that a catalyst can be made by reacting a ligand with a metal complex, and show that as starting materials bis-phosphine nickel (II) chloride is functionally equivalent with bis-allyl nickel (column 8, lines 10-25), it would have been prima facie obvious to one of ordinary skill in the art at the time of invention to modify the teachings of Buchwald, by preparing a nickel complex with allyl ligands instead of chloride ligands, as suggested by Beach, with a reasonable expectation of success, and the expected benefit of increasing the reaction rate of the catalyst by using a more electron rich ligand such as allyl instead of chloride, to increase the rate limiting oxidative addition, as suggested by Buchwald.

(10) Response to Argument

Argument in response to Rejection 1

Appellants argue that 1.) Buchwald does not disclose Appellant's specifically claimed invention, and 2.) nothing within the Buchwald reference discloses, teaches or suggest that one select Appellant's specific combination of claim requirements of inter alia, a metal atom specifically of iron, cobalt or nickel bound to a bidentate ligand through a nitrogen atom and through a phosphorus atom and thus Buchwald art does not anticipate the claimed invention.

This is not persuasive for the following reasons:

1.) Buchwald teaches catalyst made by reacting a metal precursor with a novel ligand (see abstract), which would imply that the ligands that are taught will be reacted with the metal precursors that are taught.

2.) Buchwald specifically teaches a novel "backbone" ligand that reads directly on the "backbone" ligand of the instant invention, see column 7, lines 5-45, where Buchwald teaches a ligand in formula (4) with a biphenyl group substituted with a dialkylphosphine and a dialkylamine, as R1 and R2 can be hydrogen, and R is selected from alkyls, see also formula (24) at column 25, lines 55-70, which shows a specific ligand (i.e. not a formula) that reads directly on the "backbone" ligand of the instant invention. It is also noted that Buchwald only teaches two specific compounds as "backbone" ligands, formulas (24) and (25), while all other formulas are generic. This would lead the skilled artisan to at least consider these two "backbone" ligands when

viewing the reference of Buchwald, not to mention many other compounds that will read directly on the claimed formula.

3.) Buchwald teaches a small number of metals and teaches that palladium and nickel are preferred (column 31, lines 40-48).

4.) Buchwald teaches the use of eight different specific nickel precursors, of which three will form a product reading directly on the claimed invention, if reacted with formula (24), the other five precursors will all form a compound similar to the claimed invention, but without the two X ligands.

5.) As such the instant invention is not seen as novel, as specific ligands (i.e. formula (24)) that read directly on the claimed invention are known in the art, and over a third of all the specifically preferred nickel precursors (i.e. $NiCl_2[P(C_6H_5)]_2$; $NiCl_2$(dppf) and $NiCl_2$(1,10-phenanthroline)) will form catalyst upon reaction, that read directly on the claimed invention.

Appellants state “It is also interesting to note that the examiner has previously rejected the claimed invention under 35 USC § 102(b) over Buchwald and withdrawn that rejection in the office action of February 22, 2008". Here the examiner would like to point out that the withdrawal of the 102(b) rejection was due to the amendment to the claims cancelling chloride as an X ligand in the amendment dated 12/21/2007, and was reentered upon the amendments to the claims dated 7/18/2008, which reintroduced the use of chloride as an X ligand, changing the scope of the claims and making the reference of Buchwald again anticipate the claims.

The remaining arguments in this section have been fully considered, but are not persuasive for the same reasons given above.

Argument in Response to Rejection 2

Appellants argue that Buchwald is for use in small molecular synthesis and does not relate to olefin oligomerizations/polymerizations and catalyst compounds for such. Loveday discloses a dual catalyst system for making bimodal polymers. Appellants further argue that their claimed invention is useful for olefin polymerization and not small molecule reactions. This is not persuasive for at least the following reasons:

1.) Appellants claims that are pending and under rejection are directed to “A composition of matter" there is nothing in the claims that direct the use of the product to polymerization.

2.) Appellants have not shown that the catalyst or "composition of matter” cannot have dual uses.

3.) Limitations from the specification are not read into the claims, and even arguendo they were, the claim is directed to a composition and intended use limitations do not add to the patentability of composition claims.

Appellants argue that the mere disclosure in Buchwald of a series of catalyst ligands and metals does not necessarily mean that they must coordinate and/or operate in the same way as Appellants claimed catalyst metal complex. This is not persuasive

because Buchwald teaches only two specific ligands, preferably with nickel as a metal, where of 8 nickel precursors 3 will form a compound reading directly on the claimed invention. Buchwald also teaches the reaction of these ligands with the metal precursors, and one skilled in the art would appreciate that the reaction of any of the 3 metal precursors with ligand (24) will form a compound reading directly on the claimed invention.

Appellants argue that the examiner has not given the declaration of Canich due weight. This is not persuasive and the reasons for finding the declaration of Canich not persuasive were given in the non-final action dated 9/25/2008, which are reproduced below:

Applicants submit a declaration in an attempt to overcome the rejections.

The withdrawal of the rejections makes these arguments largely moot, however the ones still deemed permanent are responded to below.

Applicants argue opinion, however it is noted that opinion evidence is given little weight in a declaration.

Applicants argue with examples using palladium, however it is noted that neither the rejection nor the instant claims are directed towards palladium.

Applicants argue that it is noteworthy that the chemical abstracts only list 2 nickel complexes with phosphino amine ligands. It is not seen how this is relevant to patentability, as a lack of a CAS number does not in any way show that Buchwald did not have possession of the claimed subject matter.

Appellants argue that the examiner gives no unequivocal reference that such a reaction (i.e. between the metal precursor and the ligand) would or could take place. This is not persuasive for at least the following reasons:

1.) The reference teaches that a catalyst will be made by reacting a metal precursor with a novel ligand (see abstract), which certainly implies a reaction will take place.

2.) One of ordinary skill in the art of metal complex catalysis would certainly have a basic understanding of coordination chemistry, which would dictate that a neutral ligand replaces a neutral ligand and not an ionic one, and that a chelate (i.e. the ligand of the reference) will replace two monodnetate ligands (i.e. the neutral ligands of the metal precursor). With these two basic principles of coordination chemistry in hand we can clearly look at the metal precursors and see that the neutral ligands that would be replaced by the chelating ligand would leave the metal with two chloride substitutents and one chelated substituent, where the molecule would read directly on the structure of the claims.

3.) As the reference definitively implies a reaction between the ligand and the metal precursor, and appellants have failed to show what other complexes could be made or why the claimed structure would not be inherently formed upon such reaction based on the laws of coordination chemistry, this argument is moot.

4.) Again it is noted that the declaration was based on opinion evidence, which is given little weight.

Appellants argue that of the 58 examples of Buchwald not a single one uses nickel. This is not persuasive as the reference is not limited to the examples or preferred embodiments, and the reference as even admitted by appellants, clearly teaches that nickel in one of the two preferred metals.

Appellants argue that Buchwald teaches away from the instant invention because it teaches that nickel and palladium are similar. This is not persuasive as the reference of Buchwald and the literature in coordination chemistry clearly recognizes the similarities of nickel and palladium, although it is also acknowledged that they can behave differently. However, for a reference to teach away there must be some teaching or suggestion that the proposed combination will not work, the examiner can find no such teaching or suggestion, and the appellants have failed to provide any, other than an opinion that differs from the known literature of coordination chemistry, without providing any data or clear scientific reasoning to support such allegations contrary to basic coordination chemistry rules.

Appellants argue that small molecule catalyst change a single molecule in some way. This is not persuasive because monomers are small molecules, and most small molecule catalyst to not function on a single substrate during a reaction (i.e. ammonia synthesis combines hydrogen and nitrogen both small molecules), and appellants have not shown that “small molecule” catalyst can not have a dual functioning ability. Finally

appellants are not claiming a polymerization catalyst, only a composition of matter. Further even if appellants were claiming a polymerization catalyst, which they are NOT, this would be an intended use limitation and would not add to the patentability of a composition claim. It is also noted that the type of catalysis is also dependant upon the reagents used to be transformed.

Here it is noted that contrary to the assertion of the appellants, the declaration of Canich does not provide clear scientific reasoning why one of ordinary skill in the art would not believe that the reaction would take place, especially in light of the teaching of the reference of the reaction of the ligand with the metal precursor, nor have these opinions been unchallenged. Again, if appellants do not believe the reaction as stated by the examiner will occur, then what reaction will happen? Do appellants propose that the negatively charged chloride ligands will be replaced by the neutral chelating ligand, rather than the labile monodentate ligands?

Here it is noted that even though the references may teach specific forms of catalysis, the basic teaching of controlling the rate limiting step by choice of accessory ligands (i.e. halogens vs. alkyl vs. amide/amines etc.) holds true, as oxidative addition/reductive elimination are commonly rate limiting steps and the rate can be controlled by selection of ligands with specific character, and there are list with ligands ordered by relative acidic/basic strength, that the skilled artisan can use to increase the

speed of either the reductive elimination or oxidative addition step, as taught/suggested in the rejection and teachings of Buchwald.

The remaining arguments in this section have been fully considered, but are not persuasive for the same reasons given above.

Argument in response to Rejection 3

These arguments have been fully considered, but are not persuasive for the same reasons given above.

Argument in Response of Rejection 4

These arguments have been fully considered, but are not persuasive for the same reasons given above.

Argument in Response of Rejection 5

Appellant's arguments are persuasive and the ODP rejection has been withdrawn.

Argument in Response to Rejection 6

Appellants amendments to claims 13 and 14 changing the dependency thereof, has been entered, and the rejection under 35 USC 112, second paragraph, has been withdrawn.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/James E McDonough/

Examiner, Art Unit 1793

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